

In the Specification

Please insert the following paragraph at Page 1, line 2,

This application is a continuation of U. S. Serial No. 09/740,281 filed December 19, 2000 which is a continuation of U. S. Patent No. 6,209,002 (U. S. Serial No. 09/251,812 filed February 17, 1999).

Please replace the paragraphs beginning at page 1, line 2 through page 1, line 10 with the following:

United States Letters Patent No. 6,092,066, granted July 18, 2000 (Serial No. 08/656,035 filed May 31, 1996) for a Method and Apparatus for Independent Operation of a Remote Data Facility which application is assigned to the Same Assignee as this application.

United States Letters Patent Serial No. 08/842,953 filed April 25, 1997 by Yuval Ofek for a Method and Apparatus for Independent and Simultaneous Access to a Common Data Set, which application is assigned to the same Assignee as this application now Patent No. 6,101,497 granted August 8, 2000.

Please replace the paragraphs beginning at page 1 line 19¹⁸ through page 3, line 5 with the following:

The maintenance of data integrity by data redundancy has become a very important issue. Data redundancy has several forms or variations. At a single site, mirroring or RAID redundancy protects against disk or other storage failure. In another form described in United States Letters Patent [Serial No. 08/656,035 filed May 31, 1996] No. 6,092,066 and others, redundancy is achieved by duplicating a local system at a remote location. The use of a remote location prevents data loss due to natural disasters and the like at one site.

In accordance with the foregoing United States Letters Patent No. 6,092,066 [Serial 08/656,035], all data processing activity occurs at a "local" or "production" site that contains a host system for processing data stored in a data storage facility. A geographically remote or backup site includes a data storage facility as a "redundant" facility for maintaining a restoration or recovery data set. In this system each time the host at the production site writes data to the production site data storage facility, the production data storage facility automatically writes data to the remote storage facility. In many, if not most, of these applications, writing data to the remote site data storage facility requires a transfer across a high bandwidth communications link so the

backup procedure does not affect operations at the production facility. T3 and ESCON lines are typically preferred as the communications links despite their expense.

United States Letters Patent No. 6,101,497 [Serial No. 08/842,953] discloses another concept involving a BCV device typically used at the production site. In this approach a data set, for example a "logical volume", on a production site data storage facility, i.e., a "production volume", operates in a normal fashion. Another logical volume at this same site is designated as a "BCV volume". An ESTABLISH command connects the BCV volume to the production volume so that the BCV volume synchronizes with the production volume. A SPLIT command thereafter can separate the BCV volume from the production volume making the data stored on the BCV volume available for another application.

Please replace the paragraph beginning at page 7, line 21 with the following:

A first level of redundancy is achieved in the data processing network 20 through interactions between the local production site 21 and the first remote site 22. As known, a host 24, that includes one or more central processors and a main memory, operates on various programs. Periodically the host 24 will effect a transfer through a host adapter 25 to a

disk storage device. This disk storage device may have many physical disk drives organized into discrete sections for storing related information. These include files or other data blocks. In the context of the equipment manufactured by the assignee of this invention, a typical storage section is a logical volume comprising a number of contiguous disk tracks and transfers are made on a track-by-track basis. In FIG. 1 an R1 logical volume 26 is representative of the many logical volumes that normally are included in such a disk storage facility. As will also be apparent the host 24 retrieves any information it needs from such a production storage facility through the host adapter 25. Such systems are well known in the art. U. S. Letters Patent [Serial No. 08/656,035]No. 6,092,066 describes one such system.

Please replace the paragraph beginning at page 9, line 24 with the following

As previously stated, United States Letters Patent Application [Serial No. 842,953]No. 6,101,497 discloses a data processing network that includes a BCV logical volume associated with a data storage facility. In accordance with this invention, a BCV/R1 logical volume 34 is included in the first remote site 22. It can comprise any dedicated logical volume within the first remote site 22 preferably on a physical

disk drive that is different from the physical disk drive that contains the R2 logical volume 32.

Please replace the paragraph beginning at page 14, line 3 with the following:

After the device controller [[34]]43 receives the command from the remote adapter 31 in step 54, the device controller [[34]]43 decodes the command in step 55 and processes that command in step 56.

Please replace the paragraph beginning at page 17, line 23 with the following:

FIG. 3 depicts operation in response to the receipt of a DIFFERENTIAL SPLIT command in more detail. When the host adapter 25 recognizes that a [differential]DIFFERENTIAL SPLIT command has been received in step 90, it tests the command for various possible error conditions as known and as described with respect to step 44 in FIG. 2. If any errors exist, the procedure aborts using a reporting procedure as known in the art. If no errors exist, control passes to step 92 that transfers the DIFFERENTIAL SPLIT command for transfer through the remote adapter 27, communications link 30 and the remote adapter 31 to enable the control 70 to respond.

Please replace the paragraph beginning at page 19, line 6 as follows:

Step 96 represents a procedure for performing a conventional split operation using basic steps from a conventional module. Details of this operation are depicted in FIG. 4. Specifically, step 101 terminates the mirroring operation of the BCV/R1 logical volume 34 as a mirror for the R2 logical volume 32. This action prevents the copy program 82 from transferring data from the R2 logical volume 32 to the BCV/R1 logical volume 34. However, each transfer to the R2 logical volume 32 will be recorded in the M3 row of the R2 track status table 76 thereby to indicate a change in the [[R2]]R1 logical volume 26 that is not reflected in the BCV/R1 logical volume 34.

Please replace the paragraph beginning at page 22, line 18 with the following:

During the interval in which the data storage facility at the first remote site 22 operates in the second operating mode copying data from the BCV/R1 logical volume 34 to the R2 logical volume 40, the host 24 can continue to issue writing operations to the R1 logical volume 26 and the R2 logical volume 32. The remote adapter 31 receives the WRITE data at

step 130 at FIG. 6. The information is written immediately to the R2 logical volume 32 in step 131 and the corresponding entries in the R2 track status table 76 are updated in step 132. In this case, the corresponding track bit position in the M3 row would be updated to indicate that WRITE operation had caused a transfer to the R2 logical volume 32, but had not caused a corresponding change in the BCV/R1 logical volume 34. Next the system would look to the session flag 81 to determine if a cascade operation were underway. If it were, step 133 would transfer control to step 134 thereby to write the corresponding status to the Protection Bits Table 75, so that the [Projection]Protection Bits Table 75 and the M3 row in the track status table 76 would have identical information. Step 134 is bypassed if a cascading operation is not underway. Step 135 then represents the process by which the control 70 completes the write operation. In the case of a normal operation the WRITE operation would complete by transferring the changed data to the BCV/R1 logical volume 34. If the BCV/R1 logical volume 34 were no longer attached, the WRITE request would be made a WRITE PENDING request.